

Past-paper walk-through

Concept and uses of classification systems ■ 1.2

eXercise

Questions in this set

- 0610/21 N25 Q2 ■ 1 mark
- 0610/22 N25 Q1 ■ 1 mark
- 0610/22 N25 Q2 ■ 1 mark
- 0610/23 N25 Q2 ■ 1 mark
- 0610/41 N25 Q1 ■ 12 marks
- 0610/43 N25 Q1 ■ 10 marks
- 0610/22 J25 Q2 ■ 1 mark
- 0610/41 J25 Q5 ■ 12 marks
- 0610/22 M25 Q1 ■ 1 mark

Reading the mark scheme

- **B1** a mark that stands on its own – the point is either made or not.
- **M1** a *method* mark: the right approach, even if the number is wrong.
- **A1** an *answer* mark, and it usually needs its M mark first.
- **C1** a working mark on the way to the answer.
- **//** separates answers the examiner accepts equally.
- **ecf** = error carried forward: a later part is marked on your own earlier answer.
- **owtte** = “or words to that effect” – the wording need not match.

Question 2

0610/21 N25 ■ Q2 ■ 1 mark

- 2** What can be used to classify organisms?
- A** the number of bases in DNA
 - B** the number of different types of bases in DNA
 - C** the sequence of bases in DNA
 - D** the sequence of bases in one protein

Solution 2

Answer: **C**

Why

- The *number* of bases just reflects the size of the genome, and there are only four types in every organism.
- What differs between species is the *order* in which those bases run.
- So classification uses the base sequence of the DNA, which is why closely related species have more similar sequences.

Question 1

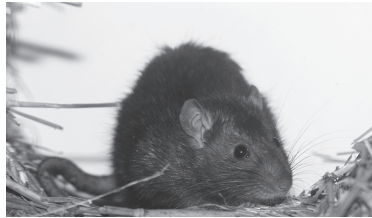
0610/22 N25 ■ Q1 ■ 1 mark

- 1 The photographs show two different rats.

Rattus norvegicus



Rattus rattus



Which statement about the rats is correct?

Question 1

- A** The rats belong to the same genus.
- B** The rats belong to the same species.
- C** The rats can breed together to produce fertile offspring.
- D** The rats do **not** share any of the same features.

Solution 1

Answer: **A**

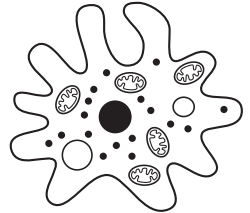
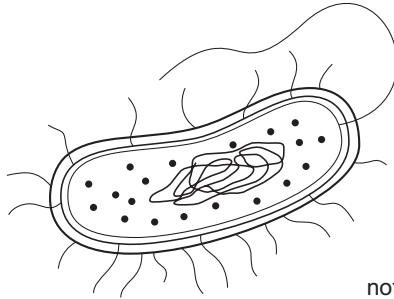
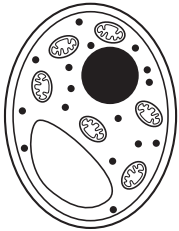
Why

- A scientific name is genus followed by species.
- Both rats are *Rattus*, so they share a genus.
- The second words differ – *norvegicus* and *rattus* – so they are different species.

Question 2

0610/22 N25 ■ Q2 ■ 1 mark

2 The diagrams show cells of organisms from three different kingdoms.



not to scale

Question 2

1

2

3

Which row shows the kingdoms for the organism cells labelled 1, 2 and 3?

	cell 1	cell 2	cell 3
A	fungus	protocist	prokaryote
B	fungus	prokaryote	protocist
C	prokaryote	fungus	protocist
D	prokaryote	protocist	fungus

Solution 2

Answer: **B**

Why

- A cell with no nucleus is a prokaryote (bacterium).
- A cell with a cell wall and chloroplasts is a plant cell.
- A cell with a nucleus but no cell wall is an animal cell.

Question 2

0610/23 N25 ■ Q2 ■ 1 mark

- 2** What are the two parts of the scientific name of an organism?
- A** genus followed by kingdom
 - B** genus followed by species
 - C** kingdom followed by genus
 - D** kingdom followed by species

Solution 2

Answer: **B**

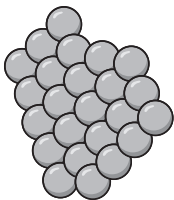
Why

- The binomial system uses two names.
- The first is the genus and the second is the species.
- Kingdom is a much broader group and never appears in the scientific name.

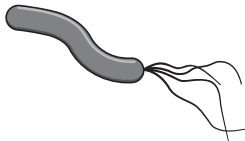
Question 1

0610/41 N25 ■ Q1 ■ 12 marks

- 1 (a) Fig. 1.1 shows drawings of seven species of bacteria.



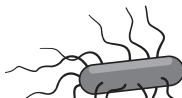
A



B



C



Question 1



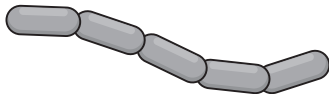
D



E



F



G

not to scale

Fig. 1.1

Use the key to identify each species of bacteria in Fig. 1.1.

Write the letter of each species (**A** to **G**) in the correct box beside the key.

Question 1

One has been done for you.

key

1	(a)	hair-like structure or structures visible	go to 2	
	(b)	no hair-like structures visible	go to 4	
2	(a)	more than one hair-like structure	go to 3	
	(b)	one hair-like structure only	<i>Vibrio cholerae</i>	
3	(a)	hair-like structures attached at one end only	<i>Helicobacter pylori</i>	
	(b)	hair-like structures attached all over	<i>Salmonella typhi</i>	
4	(a)	bacteria have a spiral shape	<i>Treponema pallidum</i>	
	(b)	bacteria do not have a spiral shape	go to 5	
5	(a)	bacteria are grouped to form a chain	go to 6	

Question 1

5	(b)	bacteria do not form a chain	<i>Staphylococcus aureus</i>	
6	(a)	bacteria in the chain are cylindrical in shape	<i>Streptobacillus moniliformis</i>	
	(b)	bacteria in the chain are circular in shape	<i>Streptococcus pyogenes</i>	F

[3]

(b) (i) A cylinder-shaped bacterium has a length of $2\mu\text{m}$ and a diameter of $0.5\mu\text{m}$.

Calculate:

- the radius of this bacterium
- the volume of this bacterium.

Include the units in your answers.

Space for working.

Question 1

Question 1

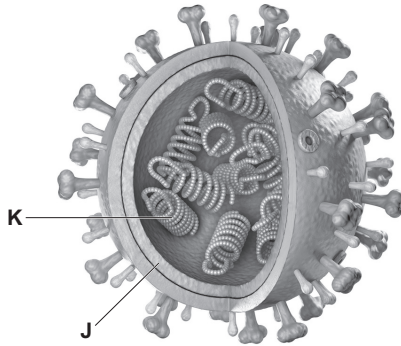
Question 1

[4]

- (ii) State the name of the kingdom that bacteria belong to.

Question 1

(c) Fig. 1.2 is a diagram of a virus.



Question 1

Question 1

Fig. 1.2

- (i) State the name of the parts labelled **J** and **K** in Fig. 1.2.

Question 1

Question 1

[2]

- (ii) State **two** structures present in bacteria that are absent in viruses.

Question 1

Question 1

[2]

[Total:12]

Solution 1

(a) Mark scheme

- go to 2
- go to 4
- go to 3
- *Vibrio cholerae*
- D
- *Helicobacter pylori*
- B
- *Salmonella typhi*

Solution 1

- E
- *Treponema pallidum*
- C
- go to 5
- go to 6
- *Staphylococcus aureus*
- A
- *Streptobacillus moniliformis*
- G
- *Streptococcus pyogenes*

Solution 1

- F
- ;;;
- 3 6 correct = 3
- 3 or 4 or 5 correct = 2
- 1 or 2 correct = 1

Solution 1

(b)(i) Mark scheme

- radius: $0.25 \mu\text{m}$;
- volume: $0.39 \mu\text{m}^3$;;;
- 4 MP1 correct radius calculated
- MP2 correct formula r^2h selected
- MP3 correct volume calculated
- MP4 correct units for both values
- ecf from previous MP

Solution 1

(b)(ii)

Mark scheme

- prokaryote ;
- 1

Solution 1

(c)(i)

Mark scheme

- J protein coat ;
- K genetic material ;
- 2
- 0610/41
- October/November 2025
- Guidance

Solution 1

(c)(ii) Mark scheme

- any two from:
- cell wall ;
- cell membrane ;
- circular / loop of, DNA ;
- plasmid ;
- cytoplasm ;
- ribosome ;
- AVP ;;

Solution 1

- 2
- e.g. flagella
- Guidance

Question 1

0610/43 N25 ■ Q1 ■ 10 marks

- 1 Scientists use classification systems to study relationships between different groups of organisms.
 - (a) State the **two** parts of a scientific name used in the binomial system.

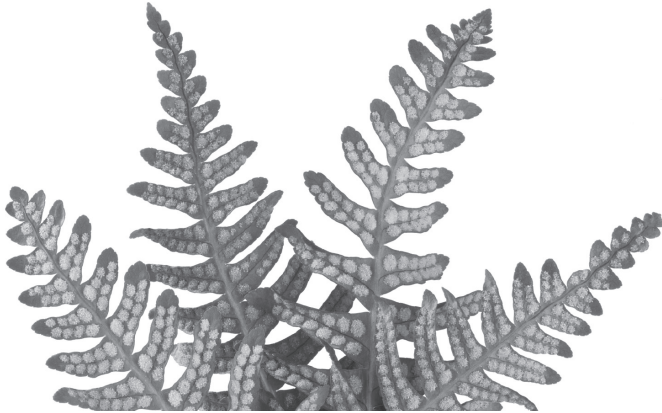
Question 1

- (b) Scientists discover a new species. It is multicellular, and has cell walls that are **not** made of cellulose. This new species feeds by releasing digestive enzymes into its surroundings and then absorbing the digested nutrients.

Identify the kingdom that the new species belongs to.

Question 1

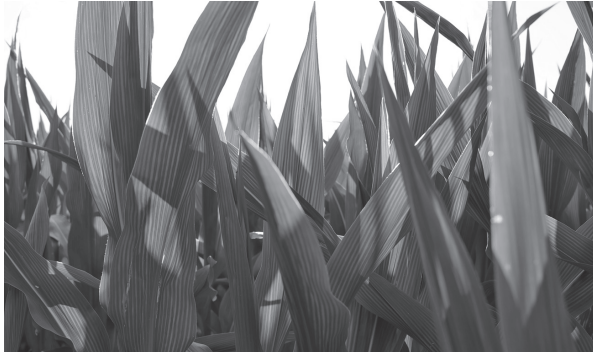
(c) Fig. 1.1 shows photographs of two different species, **X** and **Y**.



Question 1



species X



Question 1



species Y

Fig. 1.1

- (i) Species **X** and **Y** belong to the plant kingdom.

State **two** structures found in cells from species **X** and **Y** that are **not** found in animal cells.

Question 1

[2]

- (ii) Using features visible in Fig. 1.1, identify the group in the plant kingdom that species **X** and **Y** belong to.

Explain your answer.

Question 1

[4]

- (iii) Understanding evolutionary relationships between crop plants can help scientists and farmers improve agriculture.

Explain how a scientist could determine if different crop plant species share a recent ancestor (are closely related).

Question 1

[Total: 10]

Solution 1

(a)

Mark scheme

- genus AND species ;
- 1

Solution 1

(b)

Mark scheme

- fungus / fungi ;
- 1

Solution 1

(c)(i) Mark scheme

- any two from:
- 1
- chloroplast ;
- 2
- cell wall ;
- 3
- (large permanent) vacuole ;
- 4

Solution 1

- AVP ;
- 2
- e.g. starch grains

Solution 1

(c)(ii) Mark scheme

- any four from:
- species X
- 1
- fern ;
- 2
- spores ;
- 3
- fronds ;

Solution 1

- species Y
- 4
- monocotyledon ;
- 5
- narrow / long / AW, leaves ;
- 6
- parallel veins ;
- 4

Solution 1

(c)(iii) Mark scheme

- any two from:
 - 1
 - use, base / amino acid / nucleotide / gene, sequences OR sequence,
 - DNA / RNA / AW ;
 - 2
 - (crops with) recent ancestors / closely related species, will have more,
 - sequences / genes / alleles in common / will have similar,
 - sequences / genes / alleles ;

Solution 1

- 3
- AVP ;
- 2
- 0610/43
- October/November 2025
- Guidance

Question 2

0610/22 J25 ■ Q2 ■ 1 mark

2 Part of the base sequence of DNA from four species was determined.

species 1 T C A G G A T T

species 2 T G A G C A A T

species 3 T G A G C A A G

species 4 T G A G G A T T

Which two species are the **least** closely related?

A 1 and 2

B 1 and 3

C 2 and 4

D 3 and 4

Solution 2

Answer: **B**

Why

- The more bases two sequences share, the more closely related the species are.
- So compare the four sequences base by base and count the matches.
- The pair differing at the fewest positions is the most closely related.

Question 5

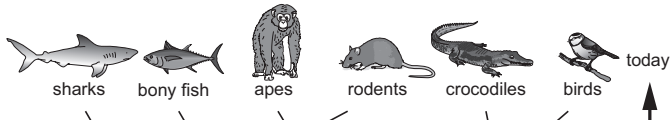
0610/41 J25 ■ Q5 ■ 12 marks

- 5 (a) Organisms can be classified by their features and by studying the sequence of bases in their DNA.

Fig. 5.1 is a diagram showing the evolutionary relationships between some different groups of organisms.

Each branch shows the point at which organisms developed new features that classify them as a new group.

The point where the branch starts also indicates a common ancestor shared by the new groups.



Question 5

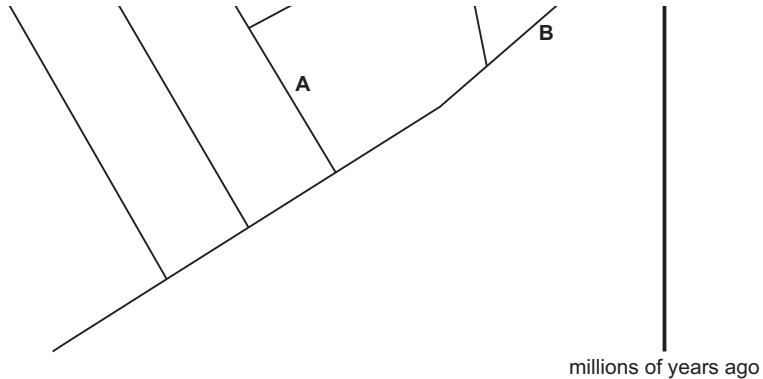


Fig. 5.1

- (i) Suggest which visible features have developed at **A** and **B** in Fig. 5.1.

Question 5

Question 5

Question 5

[2]

- (ii) Identify the names of the **two** groups that share the most recent common ancestor in Fig. 5.1.

Question 5

- (iii) Suggest the groups with the most similar and least similar DNA base sequences to crocodiles in Fig. 5.1.

Question 5

Question 5

[2]

(b) Describe the structure of a DNA molecule.

Question 5

(c) Outline how the base sequences in DNA control cell function.

Question 5

[Total: 12]

Solution 5

(a)(i)

Mark scheme

- A - hair / external ears ;
- B – wings / feathers ;
- 2

Solution 5

(a)(ii)

Mark scheme

- apes and rodents ;
- 1

Solution 5

(a)(iii)

Mark scheme

- most similar – birds ;
- least similar – sharks ;
- 2

Solution 5

(b) Mark scheme

- any four from:
- 1
- ref. to two strands / chains ;
- 2
- double helix ;
- 3
- ref. to four bases / A, T, C, G ;
- 4

Solution 5

- A pairs with T and C pairs with G ;
- 5
- ref. to bonds between bases ;
- 4 A annotated diagram
- 0610/41
- May/June 2025
- Guidance

Solution 5

(c) Mark scheme

- any three from:
- (base sequences of DNA / mRNA) determine sequence of amino acids ;
- amino acids form proteins / protein synthesis / production of proteins ;
- named example of protein ;
- ref. to sequence of amino acids determining protein shape ;
- 3
- e.g. enzymes / neurotransmitters
- Guidance

Question 1

0610/22 M25 ■ Q1 ■ 1 mark

- 1 The relationships of four species of bacteria, P, Q, R and S, were compared.
- Species P and Q have a more recent common ancestor than either species has with species R.
 - Species S developed recently from species P.

Which species has the **least** similar base sequences in their DNA compared to the other three species of bacteria?

A P

B Q

C R

D S

Solution 1

Answer: **C**

Why

- A more recent common ancestor means a closer relationship and more similar DNA.
- P and Q share a more recent ancestor with each other than with R, so P and Q are the closest pair.
- S branched off earliest, so it is the most distantly related of the four.